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ABSTRACT

This report is the third in a series of annual studies directed to institutions granting Ph.D. degrees in science in the United States and to their medical school components. Both Ph.D. and masters students are included in the 354-institution survey. Information gathered reveals that fall 1974 graduate science enrollment in institutions of higher education granting science and engineering Ph.D.'s increased almost 6 percent over the previous year; the number of women enrolled increased by 13 percent, while men enrolled increased only 3 percent. Other segments of the study cite trends in financial support, enrollment by level and area of study, and postdoctoral study. (CP)

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SCIENCE RESOURCES STUDIES HIGHLIGHTS

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Graduate Science Enrollment in 1974 Shows First Increase Since 1969[1]

The Division of Science Resources Studies has conducted the Survey of Graduate Science Student Support and Postdoctorals for three successive years. The survey is directed to all science Ph.D.-granting institutions in the United States and their medical school components. Both Ph.D. and master's students are included. In 1974, replies were received from 354 of the 355 institutions surveyed, including 104 medical schools, and data were compiled from 7,505 graduate science and engineering departments. Trend data for the period 1973 to 1974 were supplied by 5,939 departments for which data were available in both years. Longer term trends from 1967 through 1974 were derived by combining, through indices, data obtained on applications to the NSF traineeship program for the period 1967 through 1971 with survey data for the remaining three years.

- Fall 1974 graduate science enrollment in institutions of higher education granting science and engineering (S/E) Ph.D.'s increased almost 6 percent over the previous year. The gain in enrollment is the first since 1969, the peak year; however, when long-term trend data are examined in index terms, the increase represents a return to approximately the same level as in 1967.
- The 1973-74 increase occurred in both full-time and part-time enrollment, up 5 percent and 9 percent, respectively. Almost one-third more students attended on a part-time basis in 1974 than in 1967. Of the approximately 265,800 students enrolled in graduate science programs in the fall 1974 term, about 195,200, or 73 percent, were full-time students.
- The number of S/E students in their first year of graduate study rose 9 percent between 1973 and 1974 and the increase was felt in every area except the mathematical sciences. More first-year students went into the life sciences than into any other area. Indications are that some students preferred to enter graduate programs, particularly in the biological sciences, while awaiting their acceptance into medical schools. Also, many recent baccalaureate-holders elected to continue their education in order to increase their chances of finding suitable employment.
- More full-time students supported themselves through their own financial resources than in previous years. The number of self-supported students rose 14 percent between 1973 and 1974; those receiving support from their own institutions or State and local governments increased by 3 percent. Only the number of federally supported students declined.
- The number of women enrolled full time in graduate science programs went up almost 13 percent, while men increased by only 3 percent. In 1974 women represented 24 percent of the graduate science population, up considerably from their 19-percent share in 1973.
- Foreign students enrolled full time in science and engineering declined by 3 percent, continuing the trend that began in 1971, the peak year when foreign enrollment was almost one-fourth higher than the level in 1967.

[1]The term "science" is understood throughout this report to include engineering.

Table 1. Percent change in graduate enrollment: 1973 - 74[1]

Area and field of science	1973	1974	Percent change
Total	200,708	211,826	5.5
Engineering	49,041	50,671	3.3
Civil	7,839	8,706	11.1
Electrical	13,022	13,655	4.9
Mechanical	6,789	7,108	4.7
All other	21,391	21,202	– .9
Physical sciences	31,060	31,509	1.4
Chemistry	13,063	13,013	– .3
Geosciences	5,436	5,943	9.3
Physics	9,743	9,672	– .7
All other	2,818	2,875	2.0
Mathematical sciences	17,758	17,742	– .3
Applied mathematics	4,756	4,935	3.8
Mathematics	11,395	11,049	– 3.0
Statistics	1,647	1,758	6.7
Life sciences	43,477	48,403	11.3
Agriculture	7,489	8,434	12.6
Biochemistry	3,259	3,478	6.7
Biology	5,908	6,312	6.8
All other	26,821	30,176	12.5
Psychology	17,260	18,647	8.0
Social sciences	42,072	44,857	6.6
Economics	8,927	9,194	3.0
Political science	10,757	10,993	2.2
Sociology	9,407	9,872	4.9
All other	12,981	14,798	14.0

[1]Based on full- and part-time enrollment in 5,939 matched departments reporting for 1973 and 1974.

SOURCE: National Science Foundation.

(Prepared in the Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies)

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- Four-percent fewer students relied upon fellowships or traineeships in 1974 than in 1973, but 4 percent more received research assistantships and 2 percent more received teaching assistantships.
- While graduate science enrollment increased in 1974, the number of postdoctorals appointed in science departments declined. The 2-percent drop was heavily influenced by the decline in postdoctoral appointments in the life sciences, indicating a shift to research assistants for the conduct of this research.

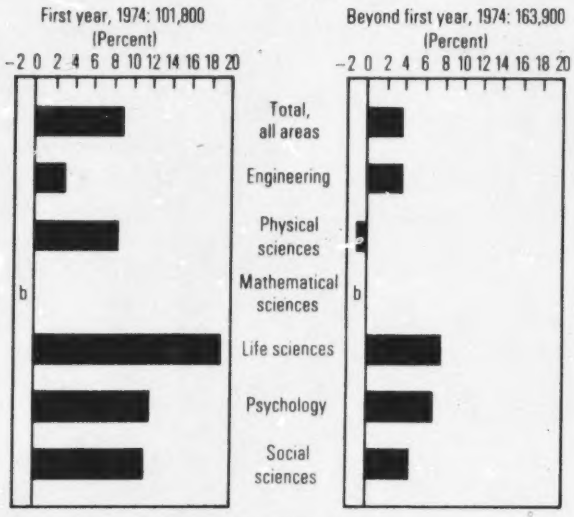
Graduate Science Enrollment

The 6-percent increase in total graduate S/E enrollment in fall 1974 is the first increase since a downward trend began in 1969. Many factors contributed to this upturn: the lack of employment opportunities for individuals with bachelor's degrees, recent achievements in the area of women's rights which gave more women the incentive to continue their education into graduate programs; and the current interest in certain graduate professions, especially medical fields. The level of enrollment in 1974 has returned to approximately the same level as in 1967 (table 1).

First-year graduate enrollment was up at an even higher rate than total enrollment, 9 percent, with first-year students enrolled in the life sciences leading the way, up 19 percent between 1973 and 1974. Mathematical sciences showed the only decrease, down less than 1 percent (chart 1).

The rate of increase in part-time enrollment was nearly double that for full-time students, an indication that as outside support for graduate education diminishes, students must depend more on employment income while attaining their degrees on a part-time basis (table 2). Also, during periods of economic recession and increasing competition for jobs, employees often continue their education part-time in order to upgrade their skills. The proportion of part-time students to the total, 27 percent, remained fairly steady, up slightly from 25 percent in 1973. In absolute terms, full-time enrollment predominates; of the 265,800 total graduate science students in 1974, approximately 70,600 were enrolled part time. Between 1967 and 1974, part-time enrollment increased approximately 32 percent.

Chart 1. Change in graduate enrollment by level of study and area of science, 1973-74[a]



[a]Based on 5,939 matched departments reporting in 1973 and 1974.
[b]Less than 0.5 percent change.
SOURCE: National Science Foundation

Table 2. Percent change in graduate enrollment by area of science and enrollment status: 1973-74[1]

Area of science	Total	Full time	Part time
Total	5.5	4.6	8.6
Engineering	3.3	3.3	3.3
Physical sciences	1.4	1.2	3.1
Mathematical sciences	– .3	– 1.4	2.1
Life sciences	11.3	10.4	16.8
Psychology	8.0	6.7	14.1
Social sciences	6.6	3.1	17.1

[1]Based on 5,939 matched departments reporting for 1973 and 1974.
SOURCE: National Science Foundation.

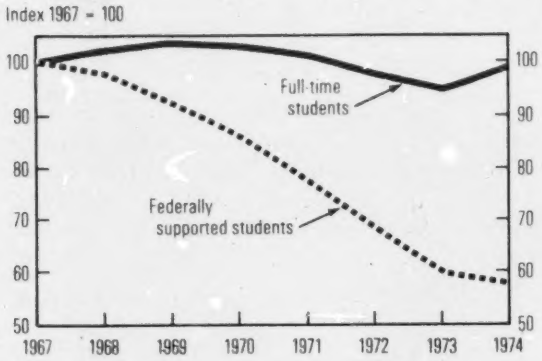
SOURCES AND TYPES OF MAJOR SUPPORT OF FULL-TIME STUDENTS

Of the 195,200 students studying full time in 1974, institutions and State and local governments continued to support the largest share, 39 percent – down from 42 percent in 1973. Those receiving Federal support accounted for 25 percent – down slightly from 26 percent in 1973 – and self-supported students, i.e., those depending on their own or their parents' resources, comprised 28 percent – up from 24 percent in 1973. The remaining students depended upon a variety of other sources such as foundations and industries, while many foreign students depended on their own countries for support. In every area of science except engineering and the social sciences, institutional support was the primary source of support. In engineering, the Federal Government played the predominant role; in the social sciences, self-support was the major source.

Students holding fellowships and traineeships accounted for 20 percent of the full-time students in 1974, down slightly from 21 percent in 1973, and research assistantships were available to 20 percent of the full-time students in 1974, down from 22 percent in 1973. Teaching assistantships went to 24 percent of the graduate students, down from 26 percent the previous year. The largest proportion of students, 36 percent, relied primarily upon "other" types of support, including their own resources, the same as the previous year when 31 percent did so.

The number of graduate students receiving support from the Federal Government as their principal source continued to decline. Chart 2 shows data for 1967 through 1974 converted to index

Chart 2. Trends in full-time graduate enrollment and Federal support in the sciences and engineering, 1967-74



SOURCE: National Science Foundation

numbers to accommodate a comparison over a longer time span. By 1974 the number of federally supported graduate students had dropped by approximately 42 percent from the level in 1967.

There were 3-percent fewer federally supported students in 1974 than in 1973 (chart 3). Decreases ranged from 21 percent in the mathematical sciences to 2 percent in the physical sciences. The only area to show an increase was the life sciences, up 6 percent. While Federal support was declining in 1974, self-support was up 14 percent, with the life sciences and psychology showing the highest rates of increase, 23 percent and 22 percent, respectively.

Full-time students on fellowships and traineeships declined 4 percent from 1973 to 1974, the only mechanisms of support to show a decrease. Both research and teaching assistantships were on the rise and so were "other" types of support, which showed an increase of 13 percent.

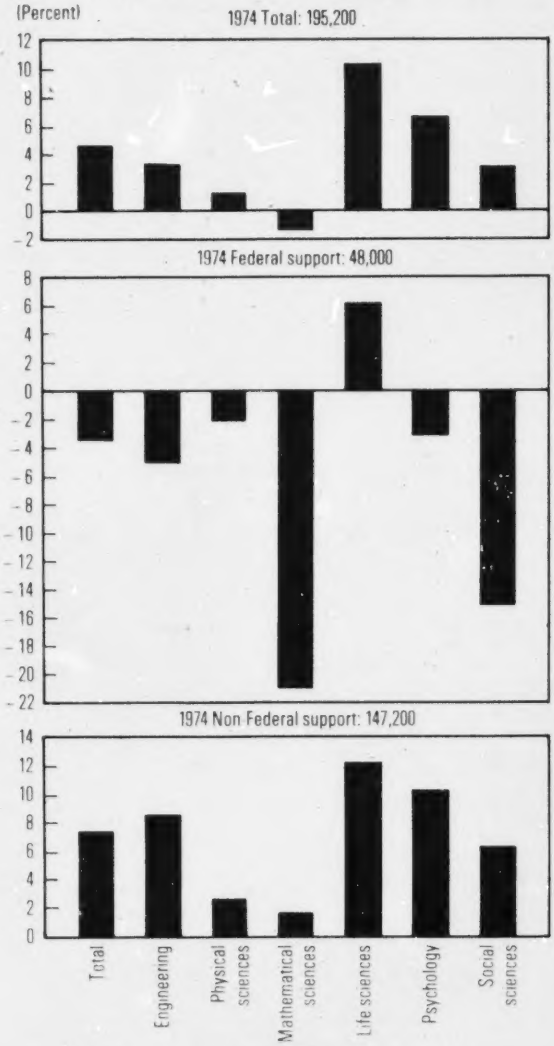
SEX OF GRADUATE STUDENTS

Women represented 24 percent of all full-time graduate science students in 1974, up markedly from 19 percent in 1973. A slightly higher proportion of men received Federal support (25 percent) than women (24 percent); the same holds true for institutional support—39 percent of the men and 37 percent of the women. Nearly 34 percent of the female students were self-supported, as compared to 26 percent of the men.

Women enrolled in both master's and doctorate departments were concentrated in the life and social sciences. Men in doctorate departments, however, tended to enroll most often in engineering and the life sciences; and in master's departments, in the social sciences. Women in their first year of graduate school tended to concentrate in the life and social sciences; men in their first year were predominantly in engineering and life sciences (table 3).

Full-time female graduate science enrollment increased 13 percent between 1973 and 1974, while male enrollment increased by only 3 percent. Self-support for both sexes increased — for men by 12 percent, for women by 22 percent. Institutional support of both men and women was also up—2 percent and 11 percent, respectively—while Federal support for men was down 6 percent, and up for women, 8 percent. The number of women majoring in science in their first year of graduate school increased 22 percent, compared with 7 percent for first-year male enrollment.

Chart 3. Change in full-time graduate enrollment and sources of major support, by area of science, 1973-74[a]



[a]Based on 5,939 departments reporting in 1973 and 1974.

SOURCE: National Science Foundation

Table 3. Distribution of full-time graduate students, by sex, level of study, and area of science: 1974[1]

Sex of student and level of study	Total number	Percent distribution						
		Total	Engineering	Physical sciences	Mathematical sciences	Life sciences	Psychology	Social sciences
Total	195,196	100.0	17.6	15.0	6.7	28.7	9.4	24.7
Men	148,640	100.0	22.1	17.3	7.1	24.9	7.4	21.2
First year	53,558	100.0	26.7	13.4	6.8	24.4	5.9	22.8
Beyond first year	95,082	100.0	19.4	19.5	7.2	25.2	8.2	20.4
Women	46,556	100.0	3.3	7.4	5.3	32.5	15.8	35.7
First year	20,001	100.0	4.1	6.3	5.6	34.4	12.3	37.3
Beyond first year	26,555	100.0	2.7	8.2	5.2	31.2	18.4	34.4

[1]Based on data received from 7,505 graduate science departments in 1974.

SOURCE: National Science Foundation.

CITIZENSHIP

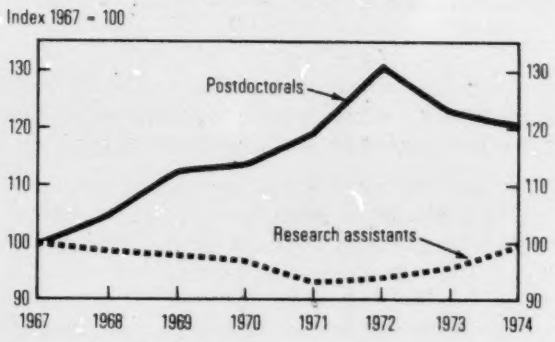
The increase in full-time enrollment between 1973 and 1974 was characterized by a 6-percent rise in the number of graduates holding U.S. citizenship and a 3-percent decline in foreign student enrollment. In index terms, the number of foreign graduate students reached its peak in 1971, when enrollment was almost one-fourth higher than the 1967 level. The continuous downward trend, noted since 1971, shown in all areas of science, indicates that foreign students are finding it even harder than U.S. citizens to acquire graduate science degrees in a period of increasing tuition and living costs, coupled with a tightening job market and Federal visa restrictions on the employment of foreign students. Foreign students represented 16 percent of all full-time graduate students in 1974, down from 19 percent in 1973.

Postdoctorals

In 1974 the number of postdoctorals reported was 16,800. Of these, 9,700 or 58 percent, received their Ph.D's after 1970. Of the total number, 11,800, or 71 percent, were supported mainly by Federal funds; also, of these 11,800 Ph.D's, 61 percent were research associates, and the remainder were fellows and trainees.

The number of postdoctorals appointed in science departments averaged a 2-percent decline between 1973 and 1974. Changes in the number of appointments ranged from a 4-percent decrease in the life sciences to an 11-percent increase in psychology.

Chart 4. Postdoctoral and research assistants in science Ph.D.-granting institutions, 1967-74



SOURCE: National Science Foundation.

The downturn in postdoctoral utilization that began in 1972 continued into 1974, but at a slower pace (chart 4). Meanwhile, the number of students holding research assistantships climbed back up almost to their 1967 level. In 1974 Federal agencies increased their support of research assistants, as did the institutions themselves, foundations, and private industry, reversing the trend of the recent past.

Further statistical findings are available in *Detailed Statistical Tables, Graduate Science Education: Student Support and Postdoctorals, Fall 1974.* (NSF 75-322). The final report containing a more detailed analysis of the survey data will follow.

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